Amendments to the Claims:

1. (Currently Amended) A linear RF transmitter for the transmission of non-constant envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into a phase component, and to further resolve the phase component into In-phase (I) and quadrature (Q) components;

conversion means arranged to generate analogue representations of the signal components;

phase modulation means arranged to receive the analogue representations of the In-phase and quadrature components and to upconvert and phase modulate the I and Q components into an RF signal, further comprising a first oscillator arranged to produce an intermediate frequency signal:

a first IQ modulator means to phase modulate the intermediate frequency signal with the I and Q signal components;

a second oscillator arranged to produce a reference frequency signal; and

a phase lock loop to upconvert the modulated intermediate frequency signal to the radio frequency; further comprising a voltage controlled ascillator;

phace comparison means; and summing and mixing means;

wherein the phase comparison means is arranged to receive the phase modulated intermediate frequency signal and a mixed signal output from the mixer means and to control the voltage controlled oscillator therefrom, and wherein the voltage controlled oscillator is arranged to output a constant amplitude phase modulated signal in response to the phase comparison means and wherein the summing and mixing means are arranged to sum the constant amplitude phase modulated signal with the RF signal fed back from the output of the output power amplifier means, and mix the resulting signal with the reference frequency signal to generate the mixed signal fed to the phase comparison means;

said phase modulation means further comprising binary modulator means arranged to receive the phase modulated RF signal and to be controlled by the baseband processing means to remove any 180 degree phase shifts introduced into the phase modulated RF

signal,

the upconverted intermediate frequency signal is output as the phase modulated RF signal at a frequency the sum of the intermediate frequency and the reference frequency;

output power amplifier means arranged to receive the phase modulated RF signal and amplify the signal for transmission;

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplifier means in accordance with the amplitude component whereby to amplitude modulate the RF signal; and

synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal, wherein the baseband processing means are further arranged to resolve the amplitude component from the input signal, and the conversion means are further arranged to generate an analogue representation of the amplitude component and feed the analogue representation to the direct amplitude modulating means.

- (Cancelled) 2.
- (Cancelled) 3.
- (Previously presented) A transmitter according to claim 1, wherein the phase modulation 4. means further comprise:
 - a first oscillator arranged to produce an intermediate frequency signal;
- a first IQ modulator means to phase modulate the intermediate frequency signal with the I and Q signal components;
- an envelope detector means to detect the amplitude component of the phase modulated intermediate frequency signal and to feed the amplitude component to the direct amplitude modulation means;

limiting means to remove the amplitude component from the phase modulated intermediate frequency signal;

- a second oscillator arranged to produce a reference signal; and
- a phase lock loop arranged to receive the limited phase modulated intermediate

Amendments to the Claims:

(Currently Amended) A linear RF transmitter for the transmission of non-constant envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into a phase component, and to further resolve the phase component into in-phase (I) and quadrature (Q) components;

conversion means arranged to generate analogue representations of the signal components;

phase modulation means arranged to receive the analogue representations of the In-phase. and quadrature components and to upconvert and phase modulate the I and Q components into an RF signal, further comprising a first oscillator arranged to produce an intermediate frequency signal:

a first IQ modulator means to phase modulate the intermediate frequency signal with the I and Q signal components;

a second oscillator arranged to produce a reference frequency signal; and

a phase lock loop to upconvert the modulated intermediate frequency signal to the radio frequency; further comprising a voltage controlled oscillator;

phase comparison means: and

summing and mixing meuns,

wherein the phase comparison means is arranged to receive the phase modulated intermediate frequency signal and a mixed signal output from the mixer means and to control the voltage controlled oscillator therefrom, and wherein the voltage controlled escillator is arranged to output a constant amplitude phase modulated signal in response to the phase comparison means and whorein the summing and mixing means are arranged to sum the constant amplitude phase-medulated signal with the RF-signal fed back from the output of the output power numplifier means, and mix the resulting signal with the reference frequency signal to generate the mixed signal fed to the phase sumparison means;

said phase modulation means further comprising binary modulator means arranged to receive the phase modulated RF signal and to be controlled by the basehand processing means to remove any 180 degree phase shifts introduced into the phase modulated RF

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signal,

the upconverted intermediate frequency signal is output as the phase modulated RF signal at a frequency the sum of the intermediate frequency and the reference frequency;

output power amplifier means arranged to receive the phase modulated RF signal and amplify the signal for transmission;

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplifier means in accordance with the emplitude component whereby to amplitude modulate the RI' signal; and

synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal, wherein the baseband processing means are further arranged to resolve the amplitude component from the input signal, and the conversion means are further arranged to generate an analogue representation of the amplitude component and feed the analogue representation to the direct amplitude modularing means.

- (Cancelled) 2.
- (Cancelled) 3.
- (Previously presented) A transmitter according to claim 1, wherein the phase modulation 4. means further comprise:
 - a first oscillator arranged to produce an intermediate frequency signal;
- a first IQ modulator means to phase modulate the intermediate frequency signal with the I and Q signal components;
- an envelope detector means to detect the amplitude component of the phase modulated intermediate frequency signal and to feed the amplitude component to the direct amplitude modulation means;

limiting means to remove the amplitude component from the phase modulated intermediate frequency signal;

- a second oscillator arranged to produce a reference signal; and
- a phase lock loop arranged to receive the limited phase modulated intermediate

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frequency signal and to upconvert said signal to the radio frequency;

wherein the upconverted intermediate frequency signal is output as the phase modulated RF signal at a frequency the sum of the intermediate trequency and the reference frequency.

- (Cancelled) 5.
- (Cancelled) 6.
- (Currently Amended) A linear RI transmitter for the transmission of non-constant 7. envelupe modulated signals, comprising:

baseband processing means arranged to resolve an input signal into a phase component, and to further resolve the phase component into In-phase (1) and quadrature (O) compouents;

conversion means arranged to generate analogue representations of the signal <u>components:</u>

phase modulation means arranged to receive the analogue representations of the In-phase and quadrature components and to unconvert and phase modulate the I and O components into an RF signal, further comprising a first oscillator arranged to produce an intermediate frequency <u>siynal.</u>

a first 10 modulator means to phase modulate the intermediate frequency signal with the I and O signal components;

a second oscillatur arranged to produce a reference frequency signal; and a phase lock loop to upconvert the modulated intermediate frequency signal to the radio frequency;

the upconverted intermediate frequency signal is output as the phase modulated RF signal at a frequency the sum of the intermediate frequency and the reference frequency;

output power amplifier means arranged to receive the phase mudulated RF signal and amplify the signal for transmission;

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplified means in accordance with the supplitude component whereby to amplitude modulate the RE signal;

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synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal, wherein the baseband processing means are further arranged to resolve the amplitude component from the input signal, and the conversion means are further arranged to generate an analogue representation of the amplitude component and feed the analogue representation to the direct amplitude modulating means; and

A transmitter-uncoording to claim 1, wherein the phase modulation means further comprise:

a second IQ modulator means arranged to receive the phase modulated RF signal and the baseband I and Q components and to further phase modulate the phase modulated RF signal with the baseband I and Q components whereby to remove any unwanted phase modulation introduced into the phase modulated RF signal.

- 8. (Original) A transmitter according to claim 7 wherein the second IQ modulator means are incorporated within the phase lock loop.
- 9. (Original) A transmitter according to claim 7, wherein both first and second IQ modulator means are incorporated in the feedback path of the PLL.
- 10. (Previously Presented) Λ transmitter according to claim 7, and further comprising phase modulation synchronising means; and respective in-phase and quadrature signal component delay means arranged to control the phase modulation performed in the second IQ modulation means;

wherein said phase modulation synchronising means is arranged to detect phase modulation errors introduced into the phase modulated RF signal and to control the delay means therefrom whereby to reduce modulation synchronisation errors in the phase modulated RF signal.

11. (Original) A transmitter according to claim 10, wherein the phase modulation synchronising means is arranged to receive the amplitude component of the input signal, a phase rotation signal from the baseband processing means, and the voltage controlled oscillator control signal from the phase comparison means, and to detect phase modulation errors therefrom.

12. (Currently Amended) A linear RF transmitter for the transmission of non-caustant envelope modulated signals, comprising:

baseband processing means arranged to resulve an input signal into a phase component, and to further resolve the phase component into In-phase (I) and quadrature (Q) components:

conversion means arranged to generate analogue representations of the signal

phase modulation means arranged to receive the analogue representations of the In-phase phase modulation means arranged to receive the analogue representations of the In-phase phase modulate the I and O components into and quadrature components and to upconvert and phase modulate the I and O components into an RF signal, further comprising a first oscillator arranged to produce an intermediate frequency aircraft.

a first IQ modulator means to phase modulate the intermediate frequency signal with the Land Q signal companions:

a second oscillator arranged to produce a reference frequency signal; and
a phase lock loop to upconvert the modulated intermediate frequency signal to the
radio frequency; further comprising a voltage controlled oscillator;

phase comparison means; and

summing and mixing means.

wherein the phase comparison means is arranged to receive the phase mudulated intermediate frequency signal and a mixed signal output from the mixer means and to control the voltage controlled oscillator therefrom, and wherein the voltage controlled oscillator is arranged to output a constant amplitude phase modulated signal in response to the phase comparison means and wherein the summing and mixing means are arranged to sum the constant amplitude phase modulated signal with the RF signal fed back from the output of the output power amplifier means, and mix the resulting signal with the reference frequency signal to generate the mixed signal fed to the phase comparison means.

the unconverted intermediate frequency signal is output as the pluse modulated RF signal at a frequency the sum of the intermediate frequency and the reference frequency;

output power amplifier means arranged to receive the phase modulated RF signal

and amplify the signal for transmission:

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplifier means in accordance with the amplitude component whereby to amplitude modulate the RF signal; and synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal. A transmitter according to claim I wherein the phase lock loop further comprises:

summing means disposed between the phase comparison means and the voltage controlled oscillator:

differentiation means arranged to receive the baseband component from the baseband processing means and to differentiate the phase component with respect to time,

wherein the summing means receives the differentiated phase component and the output from the phase comparison means and steers the voltage controlled oscillator on the basis of the resulting sum.

(Previously Presented) A linear RF transmitter for the transmission of non-constant 13. envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into a phase component, and to further resolve the phase component into In-phase (I) and quadrature (O) components;

conversion means arranged to generate analogue representations of the signal components;

phase modulation means arranged to receive the analogue representations of the In-phase and quadrature components and to upconvert and phase modulate the Land Q components into an RF signal:

control power amplifier means arranged to receive the phase modulated RF signal and amplify the signal for transmission:

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplifier means in accordance with the amplitude component whereby to amplitude modulate the RF signal; and

synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal and A transmitter uncording to claim 1-wherein the conversion means further comprises:

a separate digital to analogue converter for each of the amplitude component, the In-phase component and the quadrature component of the input signal;

clock means for supplying a clock signal to each of the digital to analogue converters; and

conversion control means for controlling the conversion in response to a synchronising control signal from the synchronising means.

- 14. (Original) A transmitter according to claim 13, wherein the conversion control means is a delay circuit arranged to delay the clock signal fed to the digital to analogue converters, whereby to control at least the phase of the generated representations of the input signal components.
- 15. (Previously Presented) A transmitter according to claim 13, wherein the conversion means further comprises:

a separate analogue interpolation filter for each of the amplitude component, the In-phase component, and the quadrature component of the input signal, each filter being arranged to receive the respective analogue representations of each input signal component.

16. (Cancelled)

17. (Currently Amended) A linear RF transmitter for the transmission of non-constant envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into a phase component and to further resolve the phase component into In-phase (I) and quadrature (Q) components:

conversion means arranged to generate analogue representations of the signal components;

phase modulation means arranged to receive the analogue representations of the In-phase and quadrature compounts and to upconvert and phase modulate the I and Q components into an RF signal.

justput power amplifier means arranged to receive the phase modulated RF signal and amplify the signal for transmission;

direct amplitude mixtulation means including power economy means arranged to reserve an amplitude component of the jupit signal and to control the output power amplifier means in accordance with the amplitude component whereby to amplitude modulate the RF

synchronising means arranged to monitor the RF signal and control the signal: and conversion means in response to the RF signal; A transmitter according to chim 16,

- wherein the power economy means comprises:
- a first power supply arranged to supply power at a first supply voltage to a first randucting device;
- a second power supply arranged to supply power at a second supply voltage to a second conducting device; and
- switching means arranged to switch between the first and second conducting devices;

wherein the second supply voltage is higher than the first supply voltage, and the switching means is arranged to switch from the first conducting device to the second conducting device when an amplitude peak occurs in the amplitude component of the input signal.

- (Original) A transmitter according to claim 17, wherein the first and second power 18. supplies are each switched mode power supplies.
- (Currently Amended) A linear RF transmitter for the transmission of non-constant 19. envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into a phase commonent, and to further resolve the phase component into In-phase (I) and quadrature (Q) components:

conversion means arranged to generate analogue representations of the signal
conversion means arranged to kendals
phase modulation means arranged to receive the analogue representations
of the In-phase and quadrature components and to upconvert and phase modulate the I and O
components into an RF signal. Output power amplifier means arranged to receive the phase modulated RF signal
direct amplitude modulation means including power control the output power amplifier
means in accordance with the amplitude component whereby to amplitude modulate the RF
signal: and synchronising means arranged to monitor the RF signal and control the synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal A transmitter according to claim 16,
conversion means in response to the or signer.
wherein the power economy means comprises: a switching device arranged to be controlled by the baseband processing means;
and an inductor connected between the power amplifier and the switching device;
the switching device to see a second processing means controls the switching device to
wherein the basebatta processing interpretation of voltage pulse which is integrated by the inductor to give an approximate shape representation of
the amplitude component of the input signal.
20. (Original) A transmitter according to claim 19, wherein the power economy further
comprise: a comparator amplifier arranged to operate in a linear manner and arranged to
a comparator amplifier arranged to operate in a successful voltage pulse, and output
a comparator amplified arranged to oppose a comparator amplified arranged to oppose the amplitude component of the input signal and the integrated voltage pulse, and output receive the amplitude component of the input signal and the integrated voltage pulse, and output
a difference signal therefrom; and an adder arranged to receive the integrated voltage pulse and the difference signal
an adder arranged to receive the sum of the two received and output a sum signal to the power amplifier corresponding to the sum of the two received
signals; whereby the shape of the voltage pulse may be finely controlled so as to accurately

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represent the amplitude component of the input signal.

(Previously Presented) A linear RF transmitter for the transmission of non-constant 21. envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into phase components a phase component, and to further resolve the phase components component into Inphase (I) and quadrature (Q) components;

conversion means arranged to generate analogue representations of the signal

phase modulation means arranged to receive the analogue representations of the components; In-phase and quadrature components and to upconvert and phase modulate the I and Q components into an RF signal;

output power amplifier means arranged to receive the phase modulated RF signal and amplify the signal for transmission;

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplifier means in accordance with the amplitude component whereby to amplitude modulate the RF signal; and

synchronising means arranged to munitor the RF signal and control the conversion means in response to the RF signal further comprising:

phase detector means arranged to detect the phase of the RF output signal;

amplitude detector means arranged to detect the amplitude envelope of the RF output signal;

synchronisation detector means arranged to detect the synchronisation between the phase and the amplitude of the RF output signal; and

synchronisation control means arranged to control the conversion means on the basis of the detected synchronization.

22. (Original) A transmitter according to claim 21, wherein the phase detector means further comprises:

a delay circuit and a mixer arranged to act together as an FM discriminator;

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- a first low pass filter arranged to receive the output of the FM discriminator;
- a second low pass filter arranged to receive the output of the FM discriminator;

and

a comparator arranged to receive an output from the first low pass filter and compare this with a reference voltage, the difference being used to control the delay circuit so that the FM discriminator outputs a fixed DC level voltage;

wherein the fixed DC voltage is manifested as a voltage pulse at the output of the second low pass filter whenever there is a change of phase.

(Cancelled) 23.

(Currently Amended) A linear RF transmitter for the transmission of non-constant 24 envelope modulated signals, comprising:

baseband processing means arranged to resolve an input signal into phase components a phase component, and to further resolve the phase components component into Inphase (I) and quadrature (O) components;

conversion means arranged to generate analogue representations of the signal components:

phase modulation means arranged to receive the analogue representations of the In-phase and quadrature components and to upconvert and phase modulate the I and Q components into an RF signal;

output power amplifier means arranged to receive the phase modulated RF signal and amplify the signal for transmission;

direct amplitude modulation means arranged to receive an amplitude component of the input signal and to control the output power amplifier means in accordance with the amplitude component whereby to amplitude modulate the RF signal; and

synchronising means arranged to monitor the RF signal and control the conversion means in response to the RF signal.

wherein the baseband processing means are further arranged to resolve the amplitude component from the input signal, and the conversion means are further arranged to

generate an analogue representation of the amplitude component and feed the analogue representation to the direct amplitude modulating means.

wherein the amplitude detector means further comprises an envelope detector for detecting the amplitude envelope; and

a differentiator arranged to receive the output of the envelope detector and differentiate the signal with respect to time; A transmitter according to claim 23 and wherein the synchronisation detector comprises a sampling gate arranged to sample the differentiated amplitude envelope in response to the voltage pulse from the phase detector whereby when the amplitude and phase of the RF signal are synchronous, the sampled signal will be zero.

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